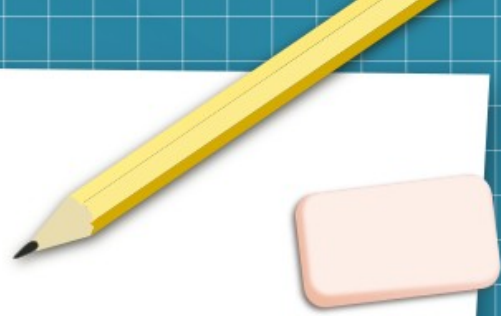


Operational Data Transport in the IVS

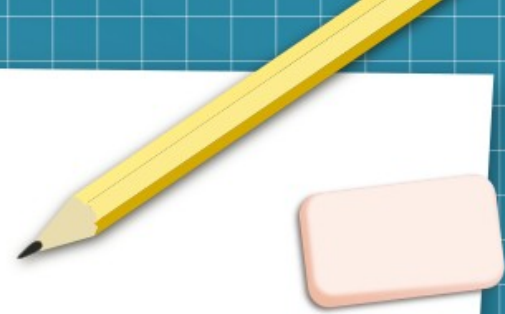
Simone Bernhart's part
(Reichert GmbH/BKG/MPIfR)

Outline

- e-transfer protocols & command line examples
- Prerequisites for e-transfers
- Transfer web page
- Shipment with **PACKTRACK**



e-Transfer Protocols & Examples



- File Transfer Protocols:
 - FTP/FTPS, HTTP/HTTPS, RCP, SCP
 - Tsunami (UDP based transfer with TCP control)
 - UDP-based Data Transfer Protocol (UDT)
 - ...
 - [jive5ab/m5copy](#)
 - [etransfer server/client system](#)

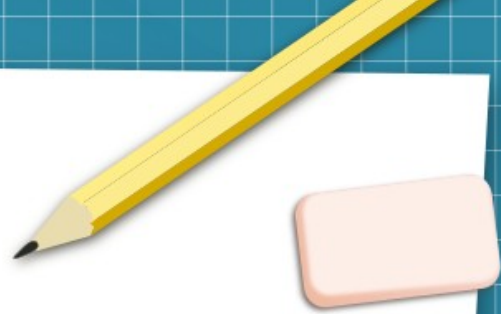
e-Transfer Protocols & Examples



- jive5ab/m5copy

- <https://github.com/jive-vlbi/jive5ab>
- The VLBI data recorder software, enabling fast and flexible VLBI data transfers as well as high-speed VLBI data recording
- e-transfer via m5copy: copy VLBI data from SRC to DST
- Start jive5ab on COMMAND port (default port 2620) on both sides
- Transfer with m5copy via DATA port (default 2630)
- m5copy ports should be different for different transfers to the same IP address
- COMMAND and DATA ports should be different
- Downside: does not allow wildcards (*) for remote transfers

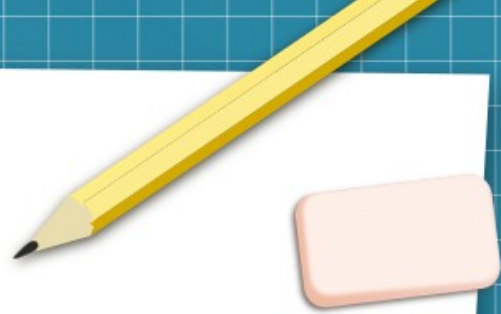
jive5ab/m5copy



- Usage:

- `m5copy SRC DST [options]`
 - `-udt` use UDT as protocol (default: tcp)
 - `-r <rate>` transfer rate (kMG)
 - `-p <port>` port for DATA (i.e. m5copy) channel
 - `-t <#sec>` socket timeout
 - `-m <mtu>` sets MTU (default 1500)
 - `--resume` appends missing bytes in case of interruption
 - `(--ignore_existing/--allow_overwrite)`

jive5ab/m5copy



- Supported formats:

- x scans on disk/server:

- file://[host][:port][:dataip]/path/to/data/(file or dir)

- x scans on FlexBuff:

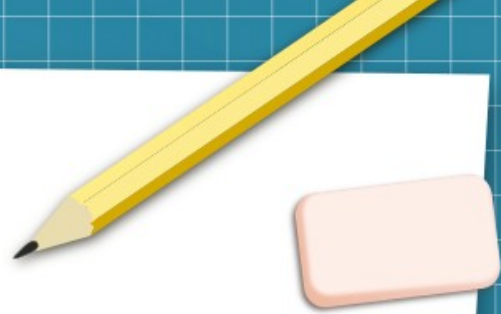
- vbs://[host][:port][:dataip]/[recording]

- x Scans on Mark5 module:

- mk5://[host][:port][:dataip][/BANK|VSN]/<scan_id>

- x ...

jive5ab/m5copy



- PUSH data, i.e. start transfer from SRC:

- x File server to correlator:

- m5copy file://[:port]/path/to/data/* file://ip.addr.at.corr/data/exp_name/ [option]


- x Flexbuff to correlator:

- m5copy vbs://[:port]/exp_name* file://ip.addr.at.corr/data/exp_name/ [option]

- x Mk5 unit to correlator:

- m5copy mk5://[:port][/BANK|VSN]/* file://ip.addr.at.corr/data/exp_name/ [option]

jive5ab/m5copy



- PULL data, i.e. start transfer from DST (or via different network):

- x Requires a filelist including full data path (if necessary) provided by stations
- x Correlator can create a shell script

- for FlexBuff data:

```
#m5copy vbs://[host][:port][:dataip]/{0} file://ip.addr.at.corr/data/exp_name/ [options]  
exp_name_st_scan1  
exp_name_st_scan2
```

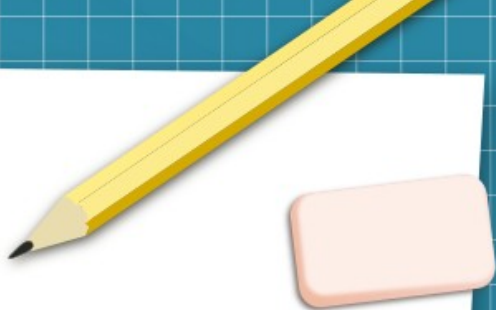
...

- for data on file system:

```
#m5copy file://[host][:port][:dataip]/{0} file://ip.addr.at.corr/data/exp_name/ [options]  
/path/to/data/exp_name_st_scan1  
/path/to/data/exp_name_st_scan2
```

...

jive5ab/m5copy



- Example command lines:

- x `$m5copy file:///kordata/ohiggins2022/t2153-fb/t2153_oh_13* file://89.114.226/data/t2153/oh/ -udt -r 800M -p 2636 --resume`
- x `$m5copy vbs://:2622/vo1301_ow_* file://89.114.226/data/vo1301/ow/ -udt -r 2000M -p 2662 -t 120 --resume`
- x `#!/cluster/jive5ab/latest/m5copy file://203.181.194.61/{0} file://195.37.231.36/data/t2p144/kg/ -udt -p 2640 -r 450M --resume`
`/mnt/raid/t2p144/t2p144_kg_013-0637.m5b`
`/mnt/raid/t2p144/t2p144_kg_013-0643.m5b`
`/mnt/raid/t2p144/t2p144_kg_013-0647b.m5b`
...
- x `#!/cluster/jive5ab/latest/m5copy vbs://193.146.252.24/{0} file://195.37.231.36/data/t2p144/ys/ -udt -r 300M -p 2648 --resume`
`t2p144_ys_012-1730a`
`t2p144_ys_012-1734`
`t2p144_ys_012-1736`

e-Transfer Protocols & Examples



- etransfer Server/Client System

- <https://github.com/jive-vlbi/etransfer>
- allows the client program to initiate server to server transfers without login to remote server
- natively supports remote wildcards
- support TCP and UDT over both IPv4 and IPv6
- works as standard daemon/client pair
- support the "--help" command line option

etransfer Server/Client System



- daemon needs to be started on data server side
- must have at least one command and one data channel specified
- client is used to perform the actual transfer
- examples:

x etd running in Wetzell:

```
$etd --command tcp://:2623 --data udt://:2634
```

x pulling Wz data from Bonn:

```
$/etc -m 5 --udt-bw 1500Mbps --udt-mss 1500 'tcp://141.74.6.203#2623:/exchange/flexbuff2/q23065wz/*' /data/q23065/wz/ --resume
```

Prerequisites for e-Transfers



- If you plan to transfer your observational data to the correlators, please provide the following information:
 - IP address(es) of the machine(s) from which you want to send the data
 - information on available bandwidth of your internet connection
- In case stations want correlators to pull the data, it might be necessary to grant access to the station servers (Bonn provides its public key to be able to log in without password).
- For transfers to Bonn please contact [geodesy\(at\)mpifr-bonn.mpg.de](mailto:geodesy(at)mpifr-bonn.mpg.de) using subject [e-transfer].

Transfer Web Page

- <https://www3.mpifr-bonn.mpg.de/cgi-bin/showtransfers.cgi>

Transfer Web Page for VLBI Stations and Correlators

Transfer Priority		
Correlator	Experiment(+Station)	Bandwidth (when indicated)
BONN	r11098	-
BONN	OHG140	-

Available transfer rates for BONN		Available transfer rates for RZ-BONN		Available transfer rates for WACO		Available transfer rates for VIEN	
TO Bonn:	9650m	TO RZ-Bonn:	950m	TO WACO:	1100m	TO VIEN:	10000m
FROM Bonn:	10000m	FROM RZ-Bonn:	0m	FROM WACO:	2000m	FROM VIEN:	2000m

List of Active Data Transfers

Started at	Sent from	Sent to	Raid	Experiment Name	Preset Transfer Rate	Port	Serial Number
2023-04-18 04:45:00	ht	Bonn	data	r11099	350m	2669	20230418044500
2023-04-18 00:58:27	kc	waco	data0	r41097	900m	46233	20230418005827

Default tsunami port 46224

Default m5copy port 2630

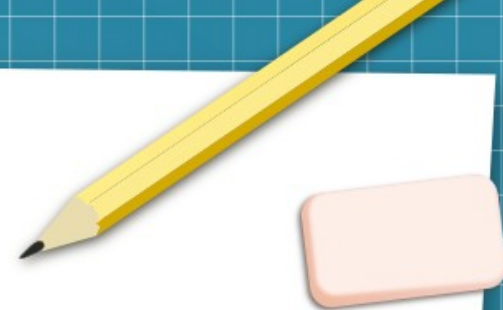
Bonn Storage Information					Haystack Storage Information					WACO Storage Information				
Raid	Via Server	Size	Free	Note	Raid	Via Server	Size	Free	Note	Raid	Via Server	Size	Free	Note
/data	bonn/rzbonn	2.8 PB	661.0 TB		/data-st10	evlbi1	36.2 TB	2.2 TB		/data0	data0	1.9 PB	796.3 TB	
					/data-st11	evlbi1	54.4 TB	3.1 TB						
					/data-st13	evlbi1	54.4 TB	3.9 TB						
					/data-st12	evlbi1	54.4 TB	15.3 TB						

Hosted by the [Goodsky VLBI Group](#) of the [Bonn VLBI correlator centre](#).

Written by Frederic Jaron.

Maintained by Simone Bernhart

Transfer Web Page



- Start message:

- Create empty file of the form

[serial number]_[experiment name]_[sent from]_[sent to]_[preset transfer rate]_[port]_[raid]_start

- x serial number: Time stamp - format: YYYYMMDDhhmmss

- x experiment name: session code

- x sent from: two-letter station code

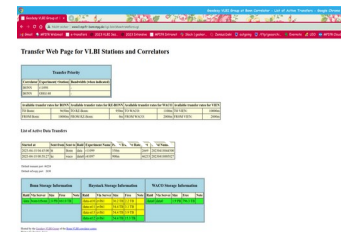
- x sent to: correlator

- x preset transfer rate: bandwidth that is used

- x port: m5copy (DATA) port

- x raid: storage raid at correlator

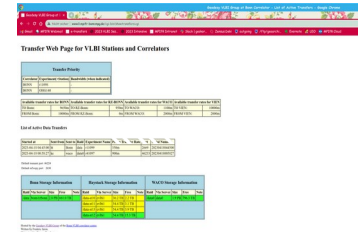
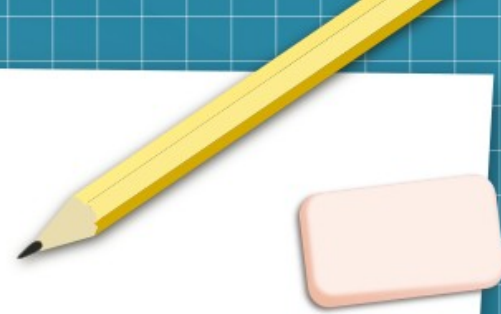
- Transfer start message to the Bonn correlator server (BONN: 89.14.226) to folder /data/transfers



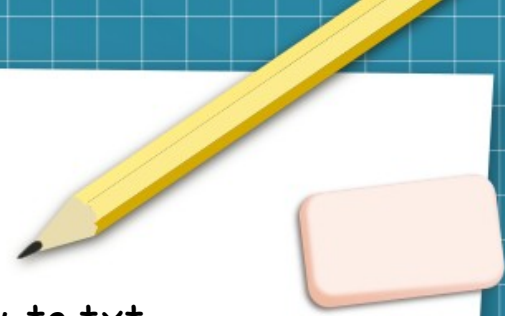
Transfer Web Page

- Stop message:

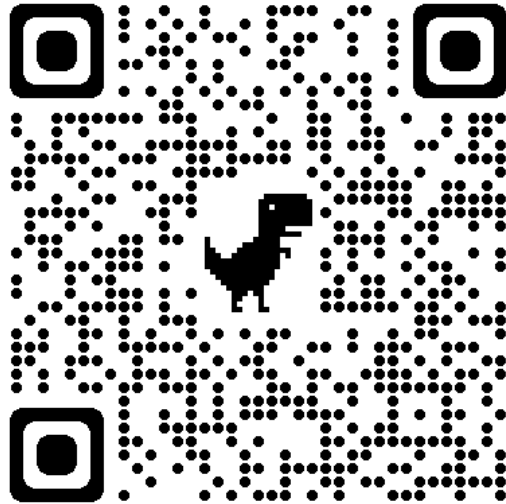
- After successful completion create stop message of the form `[serial number]_[sent from]_stop` and upload it to the same directory.
- Done.



Summary for e-transfers to Bonn

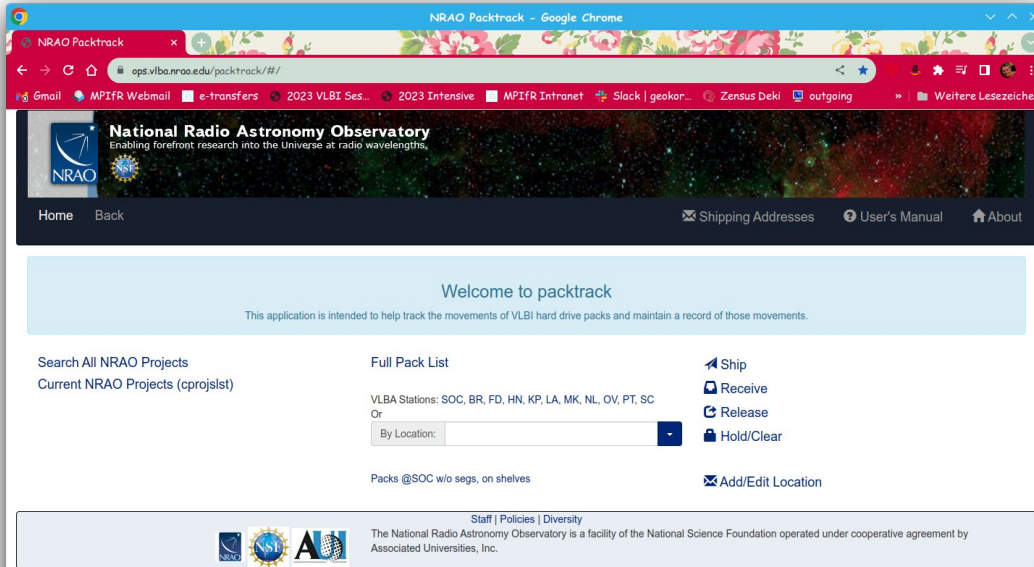


* http://www3.mpifr-bonn.mpg.de/div/vlbi/geodesy/Docs/etransfer_how-to.txt



AND NOW
FOR SOMETHING
COMPLETELY
DIFFERENT

Shipment with PACKTRACK

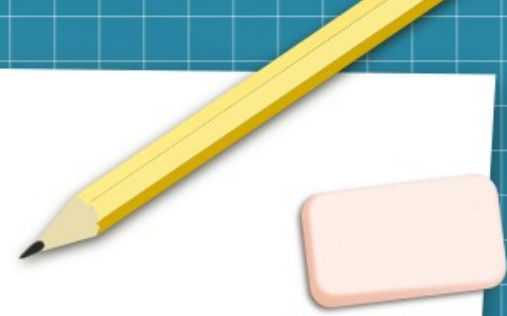


The screenshot shows a web browser window titled "NRAO Packtrack - Google Chrome" with the URL "ops.vlba.nrao.edu/packtrack/#/". The browser's address bar and tabs are visible. The page header features the NRAO logo and the text "National Radio Astronomy Observatory" with the tagline "Enabling forefront research into the Universe at radio wavelengths." Below the header is a navigation bar with links for "Home", "Back", "Shipping Addresses", "User's Manual", and "About".

The main content area is titled "Welcome to packtrack" and includes the text: "This application is intended to help track the movements of VLBI hard drive packs and maintain a record of those movements." Below this, there are several sections:

- Search All NRAO Projects** and **Current NRAO Projects (cprojslist)**
- Full Pack List** section with a search filter: "VLBA Stations: SOC, BR, FD, HN, KP, LA, MK, NL, OV, PT, SC" and "Or By Location:" followed by a dropdown menu.
- A list of actions: **Ship**, **Receive**, **Release**, **Hold/Clear**, and **Add/Edit Location**.
- A note: "Packs @SOC w/o segs, on shelves"

The footer contains logos for NRAO, NSF, and AUI, along with the text: "Staff | Policies | Diversity" and "The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc."



Shipment with PACKTRACK

The screenshot shows the NRAO Packtrack website interface. At the top, there's a navigation bar with 'Home' and 'Back' links. Below that, a search bar is visible with '4477 Results Found'. The main content area features a table of shipments with columns for VSN, Shelf, Last Activity, From, To, Status, Type, Capacity, Rate, and Control No. To the left of the table are several filter sections: 'By Location', 'By Status', 'By Capacity', 'By Rate', and 'By Tapetype', each with a 'Filter Options' button. Below the filters are 'After' and 'Before' date pickers, and a checkbox for 'With a shelf location'. At the bottom of the table, there are buttons for 'Ship', 'Receive', 'Release', 'Hold/Clear', 'Edit', and 'Create'. A footer at the very bottom contains the NRAO logo and the text: 'The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.'

VSN:II	Shelf:II	Last Activity: IF	From:II	To:II	Status:II	Type:II	Capacity:II	Rate:II	Control No
LB0%118		2023-04-20 13:56:10	SOC	FD	received	MARKG	40000	4096	1.16 days
MPH%016		2023-04-20 13:28:02	BDNN	HN	received	MARKG	48000	4096	6.29 days
LB0%095		2023-04-20 13:35:48	SOC	BR	shipped	MARKG	40000	4096	Apr201223SOC
LB0%074		2023-04-20 12:23:17	SOC	OV	shipped	MARKG	50000	4096	Apr201223SOC
LB0%184		2023-04-20 12:22:56	SOC	KP	shipped	MARKG	60000	4096	Apr201222SOC
LB0%098		2023-04-20 12:22:44	SOC	NL	shipped	MARKG	50000	4096	Apr201222SOC
LB0%125		2023-04-20 11:38:28	Y	SOC	shipped	MARKG	50000	4096	Apr201138Y
LB0%139		2023-04-20 11:35:45	SOC	HN	received	MARKG	50000	4096	1.04 days
LB0%124		2023-04-20 09:58:36	FD	SOC	shipped	MARKG	50000	4096	Apr200958FD
LB0%059	BB59	2023-04-20 09:44:13	NL	SOC	received	MARKG	48000	4096	3.07 days
LB0%170	BB74	2023-04-20 09:44:13	KP	SOC	received	MARKG	60000	4096	2.96 days
USN%0097	BB48	2023-04-20 09:44:04	PT	SOC	received	MARKG	32000	4096	pack updated
JPLK%010	BB36	2023-04-20 09:42:24	BR	SOC	received	MARKG	40000	4096	3.04 days
TBSP%023	BB47	2023-04-20 09:42:24	HN	SOC	received	MARKG	48000	4096	3.10 days
LB0%143	BB41	2023-04-20 09:42:24	OV	SOC	received	MARKG	50000	4096	3.02 days
LB0%099	BB30	2023-04-20 09:42:13	PT	SOC	received	MARKG	50000	4096	pack updated
LB0%148		2023-04-20 09:41:13	SOC	KP	received	MARKG	50000	4096	1.95 days
LB0%072		2023-04-20 09:16:44	OV	SOC	shipped	MARKG	48000	4096	7/19/062153
MPH%1208		2023-04-20 07:55:28	BDNN	NL	received	MARKG	128000	4096	6.08 days
LB0%181		2023-04-20 07:55:14	NL	SOC	shipped	MARKG	60000	4096	Apr200755NL
LB0%207		2023-04-20 06:42:59	SOC	SC	received	MARKG	48000	4096	1.81 days
JPLK%011		2023-04-20 06:42:59	SOC	SC	received	MARKG	48000	4096	1.81 days
LB0%127		2023-04-20 06:10:44	SOC	Y	received	MARKG	50000	4096	0.35 days
JPLK%002		2023-04-19 15:42:53	SOC	PT	shipped	MARKG	40000	4096	Apr191542SOC
LB0%013		2023-04-19 14:00:03	SOC	BR	received	MARKG	50000	4096	1.13 days

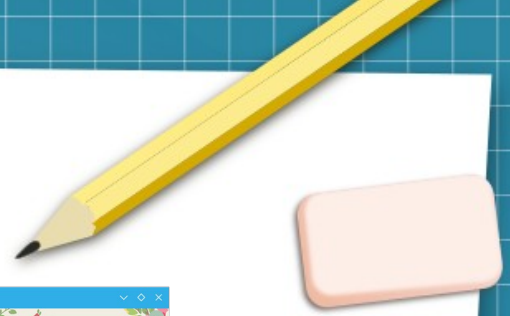
Shipment with PACKTRACK

The screenshot displays the NRAO Packtrack interface. On the left, there are search filters for VSN list, location, status, capacity, rate, and tapetype. The main area shows a table of results for VSN: HOB+0020. The table includes columns for VSN, Shelf, Last Activity, From, To, Status, Type, Capacity, Rate, and Control No. Below the table are buttons for 'Ship', 'Receive', 'Release', 'Hold/Clear', 'Edit', and 'Create'. A 'Choose a Pack' panel is visible on the right side of the results area.

VSN:II	Shelf:II	Last Activity: IF	From:II	To:II	Status:II	Type:II	Capacity: II	Rate:II	Control No
HOB+0020		2023-03-13 09:54:32	MT	B/CNN	received	MARKSPAR	6000	1024	4.10 days

Buttons: Ship, Receive, Release, Hold/Clear, Edit, Create

Choose a Pack panel: This panel will contain information about any pack you choose in the table.

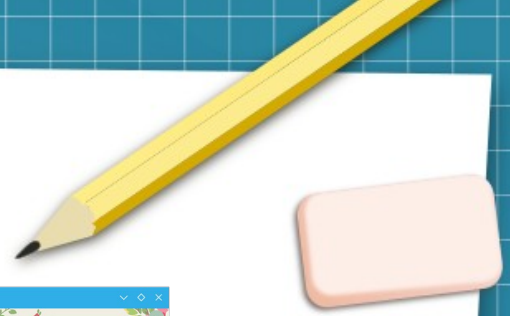


Shipment with PACKTRACK

The image displays several overlapping screenshots of the NRAO Packtrack web application interface. The central screenshot shows a 'Ship Pack(s)' modal window with the following details:

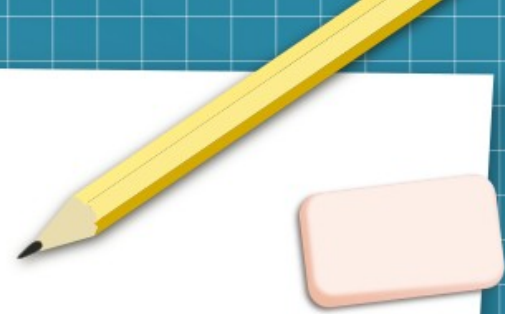
- Packs:** HOB+0020
- From:** BONN
- To:** MT
- Shipper:** FEDEX
- Control No.:** (empty field)

Buttons for 'Ship Pack' and 'Cancel' are visible at the bottom of the modal. The background shows a search results page with filters for VSN list, location, status, capacity, rate, and tapetype. A 'Choose a Pack' dialog is also visible on the right side of the interface.



Shipment with PACKTRACK

- x <https://ops.vlba.nrao.edu/packtrack/#/>
- x To get an account, contact Cynthia Thomas
cynthia.c.thomas@nasa.gov
- x Receiving AND shipping modules via input of VSN/MSN and location (station/correlator)
- x specify VSN/MSN in IVS ops message (stop)



Questions/comments?

